Depositional processes on a rapidly prograding muddy intertidal flat complex, Firth of Thames, North Island, New Zealand (poster presentation)

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In this study, we analyse the depositional processes on a muddy intertidal flat complex in New Zealand, in the Firth of Thames estuary, 70 km southeast of Auckland on the North Island, using a combination of radiochemical and granulometric analyses and X-radiography of sediment cores. The mangrove habitat in this area has been expanding rapidly over the last 50 years and is attributed to the impact of development on the surrounding areas. Changes in land use and deforestation have contributed to increased sediment yields to the estuary. This build-up of sediment is rapidly altering coastal ecosystems in the area. Along the seaward edge of the mangrove forest seedlings are colonizing open mud flats allowing forests to expand. Our study aims to increase the understanding of sediment deposition in the open mud flat areas and to understand the processes involved in sediment mixing along the fringe of the mangrove. Five cores were collected in March 2006 on a transect extending 1 km seaward of the mangrove fringe on the open unvegetated intertidal flat. Cores collected have been analysed for sediment-bound radioisotopes (^{7}Be, ^{210}Pb, ^{137}Cs), as well as grain size and sedimentary fabric, through X-radiography.

X-radiographs and ^{7}Be profiles indicate intense and rapid mixing (by waves) of the uppermost 3–7 cm of sediment on unvegetated flats. Sediment accumulation rates of 2–3 cm/y (from ^{210}Pb analysis of cores) are occurring on the unvegetated flats, much slower accumulation than the 5–10 cm/y accumulation rates observed landward in the outer edges of mangrove forest. Our observations suggest that the wave-swept unvegetated mudflats accrete relatively slowly until an elevation threshold is reached that allows mangrove recruitment. Sediment accretion in the mangrove fringe remains low until vegetation is sufficiently dense to reduce wave exposure, whereupon more rapid sediment accumulation ensues, as the young trees mature.

This depositional setting is similar to that of the many other tropical to subtropical muddy coasts worldwide, where muds accumulate on energetic open coastlines. Mechanisms of sediment transport and deposition are not well understood in these widespread environments, and we hope that our study will allow us to better understand the processes and rates of change governing morphodynamics in these important coastal settings.

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